

28 APR 1959

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27 APR 1959

Eng 729-400

m-42454

Director of Logistics

**CONFIDENTIAL**

Director of Communications

Direction Finding Antenna - [REDACTED]

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1. This Office has an urgent operational requirement for a logarithmically periodic direction finding antenna covering the range of 1 to 10 kmc. The attached proposal and cost analysis from [REDACTED] covers the development and fabrication of the antenna. We have carefully reviewed this proposal and it is considered fair and reasonable.

2. [REDACTED] was chosen because they have extensive laboratory facilities and experience in logarithmically periodic structures. Due to the extreme urgency of this requirement, the contractor has commenced work on this development. It is therefore requested that contractual action covering the expenditure of funds be backdated to 6 April 1959.

3. It is requested that contractual action be undertaken to accept this proposal in accordance with the attached documents. Attached is Requisition No. [REDACTED] indicating that the allotment to be charged for this work is [REDACTED] Funds in the amount of \$2,618.00 have been encumbered for this project. The association of the Agency with the contract and the equipment is classified **SECRET**. The actual equipment and the engineering reports, however, are **UNCLASSIFIED**. The project engineer for this work is [REDACTED]

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Please Return To Engineering Staff

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## Attachments:

- (1) Requisition No. [REDACTED]
- (2) Contractor's Proposal dated 9 April 1959
- (3) Cost and Price Analysis dated 9 April 1959

OC-E/R+D [REDACTED] (27 April 1959)

cc: R+D Subject File [REDACTED] / SPS

[REDACTED] / MSB

R+D Vital File

R+D Obligation File

WED

OC-E Chrono

R+D Chrono

EP Chrono

COORDINATION:

/R+D

SPS

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~~SECRET~~AIR MAIL  
(IN TRIPLICATE)

9 April 1959

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Washington, D. C.

Attention:

Subject: One (1) 1000-10,000 mc  
DF Antenna, Submission of Quotation for

Enclosure: (A) Estimated Cost Analysis, in triplicate

(B) Equipment Proposal and  
Specifications for One (1) 1000-10,000 mc DF  
Antenna, in triplicate

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Gentlemen:

Pursuant to a verbal request, the bidder submits the following cost-plus-fixed-fee quotation together with its estimated cost analysis, Enclosure (A), and engineering proposal, Enclosure (B), for consideration:

<u>Item</u>	<u>Description</u>	<u>Estimated Selling Price</u>
1.	Develop, construct and test one (1) 1000-10,000 mc DF Antenna	<u>\$ 2,618.</u>

The above equipment shall be in accordance with specifications as noted in the bidder's engineering proposal, Enclosure (B).

This quotation is predicated upon the award of a mutually acceptable cost-plus-fixed-fee research and development type of contract.

The bidder has not submitted a quotation predicated on award of a fixed price type of contract due to the experimental and developmental nature of the work proposed.

Delivery of Item 1 can be made by 5 May 1959 providing a notice of award, containing an anticipatory cost clause, which would allow the billing of costs incurred during the performance of work on the antenna from 6 April 1959 until contract completion, is received by 17 April 1959.

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9 April 1959

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In the event of award of contract based on this proposal, it is requested that provision be made for payments at intervals of not more than thirty (30) days, based on cost incurred and applicable proportion of the fixed fee. In addition, it is requested that a provision be included in the proposed contract which will permit the billing of General Research expense as an allowable cost thereunder.

The bidder represents that he has not employed or retained a company or person (other than full time employees) to solicit or secure this contract, and agrees to furnish information relating thereto as requested by the Contracting Officer.

Favorable consideration of the enclosed quotation is respectfully requested. Representatives of the bidder will be readily available in the event that further contractual or technical discussion is necessary. In matters pertaining to this quotation, please reference the subject proposal and address all inquiries to

Very truly yours,

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Assistant Director  
Contract Administration Division

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## PROPOSAL &amp; SPECIFICATIONS FOR ONE (1)

## 1,000-10,000 MC D/F ANTENNA

This proposal is for the design and development of a broadband high gain, unidirectional log periodic antenna for use in direction finding. The antenna will be horizontally polarized and will operate in the region from 1,000 to 10,000 mc. A 50 ohm unbalanced cable will be used as the feed line for the antenna, with a resulting mismatch of less than 5:1 over the entire band. The gain of the antenna will be greater than 10 db over a dipole throughout, with an average side lobe level of approximately 18 db.

The antenna which is proposed will consist of four periodic elements arranged in the form of an array to give end fire radiation. Fig. (1) shows an outline sketch of the entire array and also a more detailed sketch of a single element. The array may be visualized as a pyramid with two coplanar elements on one side of the pyramid and the other two coplanar elements on the opposite side. The antenna radiates from the common apex of the four elements. Proposed design parameters are  $\alpha = 20^\circ$ ,  $\beta = 30^\circ$ ,  $\gamma = 20^\circ$  and  $\tau = .90$ . The array will occupy a pyramidal volume approximately 20" by 10" at the base and 24" high. It is proposed that the array will be supported on a styrafoam block which will have the shape of a pyramid with the afore mentioned dimensions. The antenna portion will be etched by a chemical process from a sheet of copper approximately 1/32" thick. To date, the etching process is the most accurate process we know for fabricating these antennas which will operate in the KMC region. Although the log periodic antennas have no theoretical upper limit, it is the fabrication techniques which limit their use at extremely high frequencies.

From previous experience with log periodic antennas, it is known that their characteristic impedance will be other than 50 ohms. It is proposed that in order

- 2 -

to match the antenna impedance to a 50 ohm unbalanced line a broadband impedance tapered balun similar to the one shown in Fig. (2) will be employed.

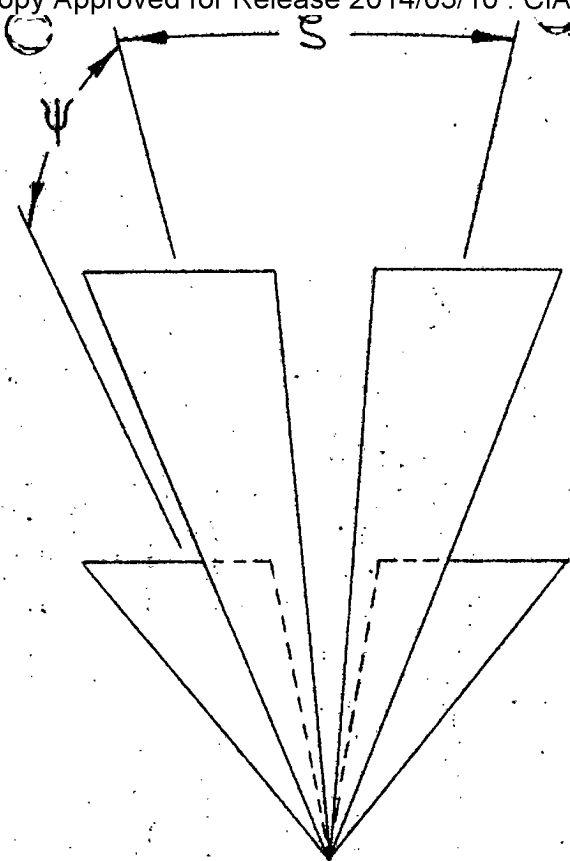
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The changing characteristic impedance of the tapered line along its length is determined so that the input reflection coefficient follows a Tschebycheff response in the pass band of the taper. Coincidental with the change of impedance, the balun also converts the energy from the unbalanced mode of propagation to the balanced mode of propagation. The balun will be suspended midway between the two faces of the pyramid which contain the elements of the antenna. A VSWR of less than 5:1 will be obtained with the use of this balun, but a VSWR of less than 3:1 will be set as a design objective.

Pattern characteristics which are expected from the array which has been described will include free space E and H-plane beamwidths of approximately  $35^\circ$  and  $45^\circ$  respectively. The E-plane patterns are taken in the plane which bisects the angle  $\psi$ , and the H-plane patterns are taken in the plane which bisects the angle  $\delta$ . The main lobe of radiation is directed away from the common vertex of the elements. Based on the half power beamwidths just mentioned, the calculated gain of the array should be approximately 12.1 db over a  $\lambda/2$  dipole, and the side lobe level will be approximately 18 db down.

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$$T = \frac{R_{N+1}}{R_N}$$

FOUR ELEMENT PERIODIC ARRAY

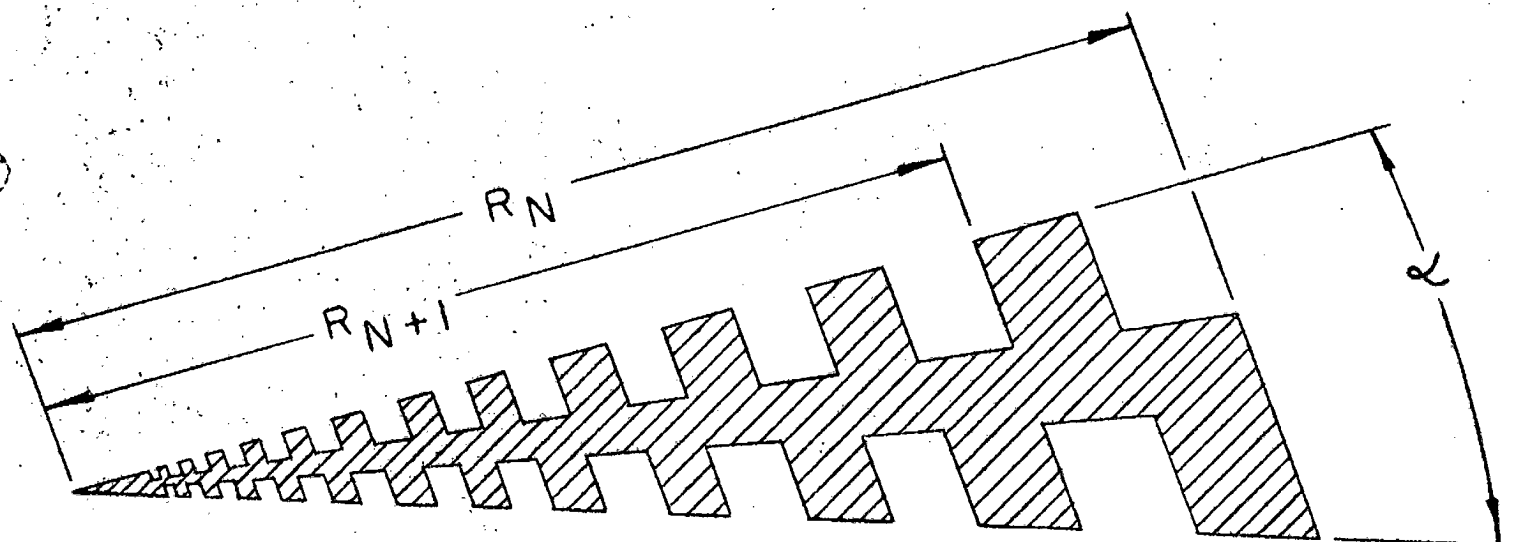


FIG. 1

VIEW OF SINGLE ELEMENT

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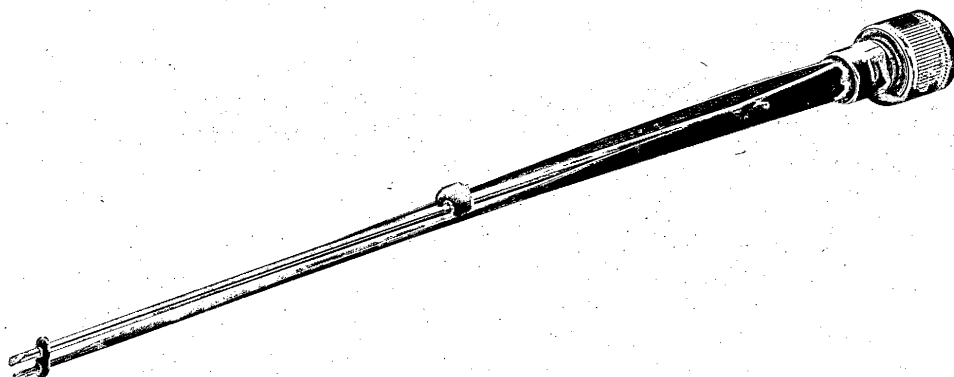


FIG. 2



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21 April 1959

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(IN TRIPLICATE)

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Washington, D. C.

Attention:

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Subject: Additional Items for 1000-10,000 mc DF Antenna,  
Submission of Quotation for

Reference: (a) Quotation letter dated  
9 April 1959

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Enclosure: (A) Estimated Cost Analysis, in triplicate

Gentlemen:

The bidder, by Reference (a), submitted a quotation for a 1000-10,000 mc DF Antenna. Subsequent verbal discussions between the bidder and the buyer have resulted in a requirement for the use of a sage rotary joint with the proposed antenna. The sage rotary joint enables the use of a semi-flexible low-loss coax system and will allow more freedom of rotation for the antenna. The use of the sage rotary joint plus the design and construction of a mounting plate so that the rotary joint can be used are both additions to the original scope of work. The bidder submits the following quotation for supplying a sage rotary joint plus a mounting plate for the 1000-10,000 mc DF Antenna:

<u>Item</u>	<u>Description</u>	<u>Estimated Selling Price</u>
1	Furnish one (1) Sage Rotary Joint plus design and furnish one (1) mounting plate	<u>\$ 781.00</u>

The total selling price for the 1000-10,000 mc DF Antenna plus sage rotary joint plus mounting plate is \$3,399.

The above equipment shall be in accordance with specifications as noted above.

The remaining terms and provisions of Reference (a) are applicable to the above quotation.

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21 April 1959

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Favorable consideration of the enclosed quotation is respectfully requested. Representatives of the bidder will be readily available in the event that further contractual or technical discussion is necessary. In matters pertaining to this quotation, please reference the subject proposal and address all inquiries to



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Very truly yours,

 Assistant Director  
Contract Administration Division  


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## NEGOTIATED CONTRACT (SUPPLIES AND SERVICES)

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REQUISITION OR OTHER PURCHASE AUTHORITY

CONTRACT/TASK ORDER NO.

50X1

Contract No.

50X1

## ISSUING OFFICE

NAME

ADDRESS

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Washington, D. C.

## CONTRACTOR

NAME

ADDRESS

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CONTRACT FOR

Development and Construction of DF Antenna

AMOUNT

\$ 4,619.00

APPROPRIATION AND OTHER ADMINISTRATIVE DATA

This negotiated contract is entered into pursuant to statutory authority and any required determination and findings have been made.

This contract is entered into, by and between the United States of America, hereinafter called the Government, represented by the Contracting Officer executing this contract, and above named Contractor who is an ☐ Individual, ☐ Partnership, ☐ Corporation, incorporated in the State of \_\_\_\_\_, hereinafter called the Contractor.

The parties hereto agree that the Contractor shall furnish the facilities and deliver all supplies and perform all the services set forth in the attached Schedule, or Task Orders, issued hereunder, for the consideration stated therein.

The rights and obligations of the parties to this contract shall be subject to and governed by the terms and conditions on the reverse hereof, attached Schedule and General Provisions. To the extent of any inconsistency between the Schedule and General Provisions, and any specifications or other provisions which are made a part of the contract by reference or otherwise, the Schedule and the General Provisions shall control. To the extent of any inconsistency between the Schedule and the General Provisions, the Schedule shall control.

The Contractor represents (a) that it ☐ is, ☐ is not, a small business concern. For this purpose, a small business concern is a concern that (i) is not dominant in its field of operation and, with its affiliates, employs fewer than 500 employees, or (ii) is certified as a small business concern by the Small Business Administration. (See Code of Federal Reg., Title 13, Ch. II, Part 103, 21 Fed. Reg. 9708, which contains the detailed definition and related procedures.), (b) that it ☐ has, ☐ has not, previously been denied a Small Business Certificate by the Small Business Administration, and (c) if offeror is a regular dealer, it also represents that all supplies to be furnished hereunder ☐ will, ☐ will not be manufactured or produced in the United States or its territories or possessions by a small business manufacturer or producer; and, further, makes the representations regarding contingent or other fees, set forth on the reverse hereof.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of 29 April 19 59.

SIGNATURES (Type or print all names under all signatures)

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CONTRACTOR

THE UNITED STATES OF AMERICA

BY

TITLE

BY

CONTRACTING OFFICER

WITNESSES (In case of corporation, witnesses not required, but certificate on the reverse must be completed.)

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## NOTICE

This material contains information affecting the National Defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C. Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

CONFIDENTIAL  
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FORM  
3-58 1398 BACK**SECRET**  
(When Filled In)

(12)

**SECURITY NOTE**

This contract and correspondence relating thereto must be handled in strict accordance with classified handling and storage instructions furnished the contractor under separate cover by the procuring activity.

**NOTE:** Contractor, if a corporation, should cause the following certificate to be executed under its corporate seal, provided that the same officer shall not execute both the contract and the certificate.

**CERTIFICATE**

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_ of the corporation named as Contractor herein; that \_\_\_\_\_, who signed this contract on behalf of the Contractor, was then \_\_\_\_\_ of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

\_\_\_\_\_  
(SIGNATURE) (Corporate Seal)

**CONTRACTOR'S STATEMENT OF CONTINGENT OR OTHER FEES**

The Contractor represents: (a) that he ☐ has, ☐ has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the Contractor) to solicit or secure this contract; and (b) that he ☐ has, ☐ has not, paid or agreed to pay to any company or person (other than a full-time bona fide employee working solely for the Contractor) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract, and agrees to furnish information relating thereto as requested by the Contracting Officer. (Note: For interpretation of the representation, including the term "bona fide employee," see General Services Administration Regulations, Title 41, Secs. 150.7 and 150.5(d), Fed. Reg. Dec. 31, 1952, Vol. 17, No. 253.)

**TERMS AND CONDITIONS**

1. **SELLER'S INVOICES** -- Invoices shall be prepared and submitted in triplicate unless otherwise specified. Invoices shall contain the following information: Contract number, Order number (if any), Item number; contract description of supplies or services, sizes, quantities, unit prices, and extended totals. Bill of lading number and weight of shipment will be shown for shipments made on Government bills of lading. The Contractor or his authorized representative will sign ONLY the original (ribbon typed copy, if typed). When the invoice is signed or receipted in the name of a company or corporation the name of the person signing, as well as the capacity in which he signs, must appear. For example: "John Doe Company, by John Smith, Secretary," "Treasurer," or as the case may be.

2. **LABOR INFORMATION** -- Attention is invited to the possibility that wage determinations may have been made under the Walsh-Healey Public Contracts Act providing minimum wages for employees engaged in the manufacture for sale to the Government of the supplies covered by this contract. Information in this connection, as well as general information as to the requirements of the act concerning overtime payment, child labor, safety and health provisions, etc. may be obtained from Wage and Hour and Public Contracts Division, Department of Labor, Washington 25; D. C.

3. **DISCOUNTS:** In connection with any discount offered, time will be computed from date of delivery of the supplies to carrier when delivery and acceptance are at point of origin or from date of delivery at destination or port of embarkation when delivery and acceptance are at either of those points, or from date correct invoice or voucher (properly certified by the Contractor) is received in the office specified by the Government if the latter date is later than the date of delivery.

4. **SAMPLES:** Samples of items, when required, must be submitted within the time specified and at no expense to the Government. If not destroyed by testing, they will be returned at Contractor's request and expense, unless otherwise specified in the Schedule.

5. **GOVERNMENT-FURNISHED PROPERTY** -- No material, labor, or facilities will be furnished by the Government unless otherwise provided in the Schedule.

6. **AGENTS** -- Contracts signed by an agent must be accompanied by evidence of his authority.

7. **ALTERATIONS** -- Any alterations in this contract made by the Contractor must be initialed by both the Contractor and Contracting Officer.

8. **MISTAKES** -- Contractors are expected to examine the drawings, specifications, circulars, schedule and all instructions pertaining to the supplies or services. Failure to do so will be at the Contractor's risk. In case of mistake in extension of price the unit price will govern.

**SECRET**

<b>SCHEDULE</b> (SUPPLY CONTRACT)		<b>CONFIDENTIAL</b>		PAGE NO. 1	NUMBER OF PAGES OF SCHEDULE 2
The supplies or services to be furnished, the specifications, the discounts, the time and place of delivery, and any other special terms and conditions applicable to the Contract, Invitation for Bids, or Request for Proposals (as applicable) are set forth below.					
REQUISITION NO. OR OTHER PURCHASE AUTHORITY [Redacted]		CONTRACT/TASK ORDER/INVITATION/REQUEST NO. (as applicable) Contract No. 131-17327-9 50X1			
SHIP TO (consignee and destination)  See Below		MAIL INVOICES TO  Issuing Office			
PERFORMANCE PERIOD/DELIVERY SCHEDULE  4 May 1959					
DELIVERY F.O.B.  Contractor's plant		INSPECTION  Contractor's Plant			
FOLLOWING DISCOUNTS WILL BE ALLOWED BY CONTRACTOR, BIDDER OR OFFEROR FOR PROMPT PAYMENT					
10 CALENDAR DAYS		PERCENT	20 CALENDAR DAYS	PERCENT	30 CALENDAR DAYS Net PERCENT
ITEM NO.	SUPPLIES OR SERVICES	QUANTITY (Number of Units)	UNIT	UNIT PRICE	AMOUNT
1	Antenna, DF, 1000-10,000 mc/s, Complete with Rotary Joint and Mounting Plate  <u>SPECIFICATIONS:</u>  The above item shall be developed and furnished in accordance with Enclosure (B) of [Redacted] letter, dated 9 April 1959, entitled "Proposal and Specifications for one (1) 1,000-10,000 mc DF Antenna" and as described in [Redacted] letter, dated 21 April 1959.  <u>SHIP TO (Consignee and Destination):</u>  [Redacted]  However, in lieu of the above consignee address, the Contractor is authorized to hand deliver the item specified hereinabove to the technical representative of the Contracting Officer.  <u>PACKING AND PACKAGING:</u>  Standard commercial for domestic shipment	1	ea	4,619.00	4,619.00
				TOTAL	4,619.00
NAME OF CONTRACTOR, BIDDER OR OFFEROR [Redacted]					

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NOTICE

This material contains information affecting the National Defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C. Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

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(SCHEDULE)

PAGE 2 OF 2 PAGES

CONTRACT/TASK ORDER NO.

Contract No. [REDACTED]

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DATA:

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(a) The term "Subject Data" as used herein includes writings, sound recordings, pictorial reproductions, drawings and other graphical representations, and works of any similar nature (whether or not copyrighted) which are specified to be delivered under this contract. The term does not include financial reports, cost analyses, and other information incidental to contract administration.

(b) The Contractor agrees to and does hereby grant to the Government, and to its officers, agents, and employees acting within the scope of their official duties, a royalty-free, nonexclusive and irrevocable license throughout the world for Government purposes to publish, translate, reproduce, deliver, perform, dispose of, and to authorize others so to do, all Subject Data now or hereafter covered by copyright; provided, that with respect to the Subject Data now or hereafter covered by copyright and not originated in the performance of this contract, such license shall be only to the extent that the Contractor, its employees, or any individual or concern specifically employed or assigned by the Contractor to originate and prepare such Data under this contract, now has, or prior to completion or final settlement of this contract may acquire, the right to grant such license without becoming liable to pay compensations to others solely because of such grant.

(c) The Contractor shall exert all reasonable effort to advise the Contracting Officer, at the time of delivery of the Subject Data furnished under this contract, (i) of all invasions of the right of privacy contained therein and (ii) of all portions of such Data copied from work not composed or produced in the performance of this contract and not licensed under this clause.

(d) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of copyright infringement received by the Contractor with respect to all Subject Data delivered under this contract.

(e) Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting scope of any license or other right otherwise granted to the Government under any patent.

(f) Subject to the proviso of (b) above and unless otherwise limited below, the Government may duplicate, use, and disclose in any manner and for any purpose whatsoever, and have others so do, all Subject Data delivered under this contract.

(g) Notwithstanding any provisions of this contract concerning inspection and acceptance, the Government shall have the right at any time to modify, remove, obliterate or ignore any marking not authorized by the terms of this contract on any piece of Subject Data furnished under this contract.

NAME OF CONTRACTOR

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## NOTICE

This material contains information affecting the National Defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C. Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

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(When Filled In)

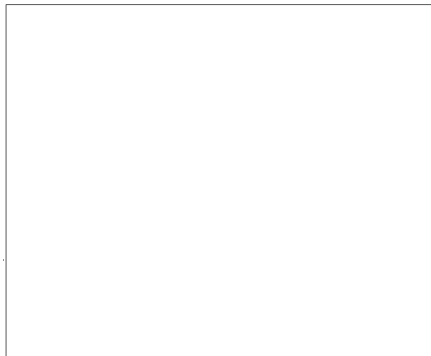
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Mailing Address:

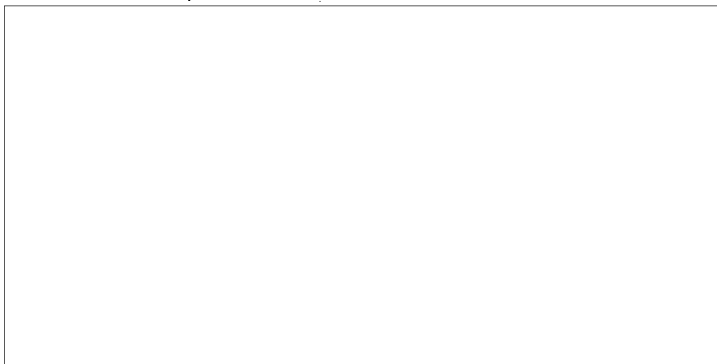
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Washington, D. C.

Classified ~~SECRET~~ internally and externally



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